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Dental students' experiences of treating orthodontic emergencies – a qualitative assessment of student reflections

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Abstract

Introduction: Professional regulatory bodies in the UK and Europe state that dental graduates should be able to manage orthodontic emergency patients. Therefore, the aim of this study was to explore dental student experiences of treating orthodontic emergencies within a teaching institution.

Materials and method: This study was designed as a single-centre evaluation of teaching based in a UK university orthodontic department. The participants were fourth-year dental students who treated orthodontic emergency patients under clinical supervision as part of the undergraduate curriculum. Student logbook entries for one academic year detailing the types of emergencies treated and structured, reflective commentaries for each procedure were analysed using thematic analysis methods. The total numbers and types of orthodontic emergencies treated by students were presented. Overall, self-reported student confidence in managing orthodontic emergencies was calculated. Themes, which represented student reflections, were identified.

Results: Seventy-two students participated in the study. Overall, 69% of students stated they were confident in managing orthodontic emergencies. Students treated a range of emergencies, of which the most frequent was debonded brackets (38%). Reflections from student commentaries were housed under a primary theme of *building procedural confidence*. Three subthemes were identified: (i) theory-practice integration; (ii) expanding clinical experience; and (iii) importance of a supportive clinical learning environment.

Conclusion: The majority of dental students were confident in managing orthodontic emergencies. Theoretical knowledge supplemented by exposure to a range of clinical problems within a supported learning environment made students feel more confident.

Introduction

An orthodontic emergency can be defined as an unscheduled appointment for treatment of a problem relating to an orthodontic appliance (1). Should an orthodontic emergency present to a dental practitioner, the General Dental Council (GDC) expect a dentist to be able to *undertake limited orthodontic appliance emergency procedures* (2). In a similar manner, competences for the European Dentist outlined by the Association for Dental Education in Europe (ADEE) state that dental graduates should be able to manage *all forms of orthodontic*

emergency, including referral when necessary (3). Dental students should therefore be exposed to orthodontic emergencies in order to develop knowledge, competence and confidence in managing orthodontic emergencies. The limited published literature in the field, however, suggests that student confidence in dealing with orthodontic emergencies is low. For example, mean self-reported confidence levels amongst final-year dental students from Cardiff University and University College Cork were low when compared with other dental procedures. Students ranked treating orthodontic emergencies as 37th of the 41 dental procedures listed in the study (4). Only confidence

levels in carrying out copy dentures, stainless steel crowns, vital tooth bleaching and surgical extractions scored lower.

Confidence in treating orthodontic emergencies continues to be low following graduation. A survey of Vocational Dental Practitioner's (VDPs) in their first year of employment found that 60% of individuals were not confident in managing an orthodontic patient (5). In addition, 72% of VDPs stated they were not confident with the use fixed orthodontic appliances and 55% with the use of removable appliances (5). Only 50% of Vocational Trainers considered new graduates to be prepared 'well' or 'very well' for an orthodontic patient in general practice. The respondent trainers perceived an inadequacy in undergraduate orthodontic training with regard to fixed and removable appliances. A separate survey of dentists with more clinical experience (i.e. who had graduated within the previous 10 years) did report more positive findings with 60% of respondents stating they were confident in treating orthodontic emergencies (6).

It is important for dentists to possess a level of confidence that will allow them to successfully manage emergency orthodontic patients if encountered in a practice setting. Understanding the reasons why self-reported confidence of students and new graduates is low would provide valuable information to feed back into teaching programmes in order for these problems to be addressed. Improvements in the learning experiences of dental students will ultimately aid both the practitioner once qualified and the clinical care that is delivered to orthodontic emergency patients. Therefore, aims of this study were to:

- Assess the self-reported confidence of dental students in treating orthodontic emergencies within a supervised clinical environment, and to:
- Explore students' reflections of treating these types of patient to construct meaning and knowledge that will guide teaching and practice.

Materials and method

Ethical approval for this study to commence was granted by Cardiff University Dental School Research Ethics Committee (DSREC reference 13/26).

The participants were fourth-year dental students ($n = 72$) at Cardiff University who treated orthodontic emergency patients during the academic year 2012–2013. Each student attended three sessions during the academic year (one each term) on the Orthodontic Clinic. These clinics had variable numbers of patients attending with a variety of clinical presentations because of the unplanned nature of the orthodontic emergency care. Students managed and/or treated orthodontic emergencies attending these sessions under the supervision of a staff member. In total, there were eight members of supervising staff who were a mix of postgraduate students and specialist orthodontists. At the end of each clinical session students were asked to complete a logbook detailing the type of orthodontic emergencies seen, treatment provided and reflections relating to the experience using a structured question framework based on Gibbs' Model of Reflection (7) (Table 1).

The lead researcher (HP) anonymised information relating to procedures after which data were manually entered into a Microsoft Excel spreadsheet by another researcher (KJ). Data

TABLE 1. Structured question framework to elicit student reflections on experiences of treating orthodontic emergencies

Stage	Description
Event	Describe the event
Feelings	What were you thinking and feeling when the event started?
Evaluation	The procedure(s) that I performed/observed today helped my understanding of orthodontics because...
Analysis	I feel/do not feel confident that I would be able to manage a similar situation when qualified because...
Action Plan	What further information/skills do you think you need?

entry was verified at a later date by the third researcher (IJ). These data were subsequently analysed and descriptive statistics were used for total number of orthodontic emergencies during the year, the frequency of emergency type and management provided and overall student self-reported confidence rating.

Qualitative data from the logbook, and the headings were entered into Microsoft Word for each logbook entry and verified again by a second researcher (KJ) at a later date. Data were then uploaded to NVivo 10 (QSR International Pty Ltd. 2014), and this was used to assist the qualitative analysis phase. Qualitative data were analysed in several stages using thematic analysis techniques (8). A single researcher (KJ) was trained in qualitative analysis techniques and the use of NVivo software prior to analysis. This researcher undertook the first five stages of analysis, which were familiarisation, initial coding, searching for themes, reviewing themes, and defining or naming themes. A second (IJ) and third researcher (HP) reviewed all of the initial coding and the themes were refined and the names of the themes were agreed. Data analysis continued until the point of saturation where no new themes emerged and the final thematic framework was established.

Results

All 72 students in the cohort participated in this study. The total number of orthodontic emergencies seen by students during the academic year was 458, equivalent to 6.3 patients per student for the academic year or two patients per student per session. Table 2 shows the frequency and percentage of problem types presenting and the management provided by dental students.

Overall, 69% of students felt confident in managing the orthodontic emergencies they encountered. A further 11% of students stated they were confident couched within a specific situation such as under supervision or after observing. Only 6% of students stated they did not feel confident in managing orthodontic emergencies and 13% of students left this section blank. Reported confidence in managing orthodontic emergencies was not associated with exposure to specific types of procedures.

Qualitative data included 168 distinct commentaries. Analysis revealed three key themes under a central theme of *building procedural confidence*. These themes were as follows: (i) theory-practice integration, (ii) expanding clinical experience and (iii) learning within a supported clinical environment. The following

TABLE 2. Type, management, frequency and percentage of orthodontic emergencies in study

Emergency type	Management	Frequency of presentation	Percentage of total presentation
Debonded bracket	Rebond bracket	172	38
Broken removable appliance	Repair or remake	68	14
Archwire problem	Retie or replace	61	13
Collect new removable appliance	Fit appliance and instruct	56	12
Other	Reassurance	28	6
Lost removable appliance	Take impression for replacement	19	4
Lost ligature from fixed appliance	Replace	18	4
Debonded fixed retainer	Repair or replace	18	4
Lost auxiliary on fixed appliance	Replace	10	2
Trauma from fixed or removable appliance	Reassure, ease appliance, give wax	8	2

sections explore the themes in detail. Student reflections within each theme are presented in Table 3.

Theme 1: Theory-practice integration

Student reflections often described processes and concepts which related to joining up aspects of their training, integrating theory and practice. This theme refers to experiences, whereby connections are made between knowledge and skills learned during theoretical and practical teaching sessions and hands on management of orthodontic emergencies. Many of the comments reflected on specific aspects, for example an appliance

typodont training course at the end of year three, which conveyed of the basics of fixed appliances and commonly encountered orthodontic emergencies. This training also gave students the opportunity to handle orthodontic instruments and work practically with simulated orthodontic procedures in a simulated clinical environment. Many students connected their theoretical training with what they were doing during the clinical treatment sessions and indicated that they could apply what they had learned. A number of reflections also indicated that students found the combination of theory and practice helpful (Table 3). Students also indicated that they felt that the training that they were given before they undertook the clinical procedures was well suited to their needs in this area (Table 3). Students also described how they developed their understanding of their theoretical teaching through their clinical experience. They suggested an enhanced level of understanding through the complimentary and reciprocal nature of their theoretical understanding with their clinical practical learning. Students also suggested an extension of their knowledge through their hands-on practical experience, which was additional to their theoretical and practical training.

Theme 2: Expanding clinical experience

The second theme related to building and expanding clinical experience. This involved seeing new procedures, extending the range of orthodontic emergencies they were exposed to and overall expansion of clinical experience. The majority of comments reflected the fact that students valued hands on practical experience and this was important for their confidence. Many also described the value of new experiences in developing their management skills and confidence (Table 3).

Students also described positive feelings towards widening their clinical experience.

Students had three sessions on the emergency clinic and this allowed patterns of orthodontic emergency to be exhibited. Common orthodontic problems triggered reflections that translated to independent practice. Students recognised that debond-

TABLE 3. Student reflections on managing orthodontic emergencies organised into respective themes

Theme	Confident	Quote
Theory-practice integration	Yes	Theory put into practice ... able to do tx [treatment] with little guidance
	Yes	It was a helpful experience as I was able to use the skills learnt in typodont
	Yes	[The] clinical practice complemented the academic program
	Yes	Practical experience helpful, helped [me] to understand reasons that brackets debond
	Yes	[This helped with my understanding of] potential problems that can occur with appliances
Expanding clinical experience	Yes	[It] increased [my] clinical experiences
	Yes	Never come across these situations before. ...good first hand experience
	Yes	I had a good experience of different types of [orthodontic] appliance
	Yes	Common problem, may present in practice, good to see
Learning within a supported clinical environment	Yes – with more practice	[I need more] practice placing brackets
	No – not without more practice	Good to observe
	Yes	[As I had] advice from supervisor, step by step help
	Yes – if supervisor present	Theoretical knowledge [has] given [me] a real perspective
	No	This case was complex.would not need to be managed in general practice

ed brackets (the most common type of emergency) may be encountered in a dental practice setting and therefore being taught how to manage the problem would aid their development (Table 3). Whilst most students were positive about their experiences, some indicated that they were struggling with the clinical aspects of practice and suggested that further exposure to specific procedures would help with confidence (Table 3). At times some students stated that whilst they were confident, they had not yet had enough breadth of experience and identified clinical learning needs whilst other students felt that in order to improve their confidence levels they would require more clinical sessions overall in order to build their confidence.

Theme 3: Learning within a supported clinical environment

The clinical learning environment affected student experience and confidence. It was clear that whilst some students found it useful to practice procedures themselves, others found the experience of observing the procedure before doing it themselves valuable. Learning was reportedly developed through observation but practical experience was considered necessary for confidence. Supervision played a key role for supporting student development and confidence, providing immediate support and feedback (Table 3). The presence of a supervisor reportedly helped students to consolidate learning, bringing together theory and practice. In addition, the presence of a supervisor affected confidence. Under the guidance of a supervisor students were also more aware of their limitations, which in turn helped them to recognise issues related to scope of practice when qualified (Table 3).

Discussion

This study found that fourth-year dental students were exposed to a range of orthodontic emergencies during an academic year. Overall, 69% of students reported feeling confident with managing a similar situation in an independent setting. This finding is significantly higher than previously published literature in the field (4, 5). This finding may be because students in the present study were reporting confidence in managing emergencies on a procedural basis rather than global level. Student responses may also have been affected by study design as they submitted these learning reflections. Whilst students were aware that logbooks are not part of a summative assessment, data collection was not anonymous and it is possible that reflections were affected by response bias, in particular, social desirability bias. In addition, as students spent three sessions on the emergency clinic over the course of the academic year, their confidence in managing orthodontic problems may have grown with time. The reflections associated with reported confidence and lack of confidence are therefore important to give meaning and understanding to the procedures experienced.

The main theme was building procedural confidence and students, which reflected the learning and development process. The first subtheme; theory to practice demonstrated the importance of integrating theoretical and practical learning managing orthodontic emergencies. The inclusion and application of theoretical knowledge extended upon findings from previous

studies (4, 5) and suggested that theory might also be important for confidence.

The second subtheme; expanding clinical experience highlighted the importance of hands on experience. Students' reported learning experiences varied, and hands-on practical experience was described as being important. Whilst some students reported having received sufficient experience, others reported that they had additional learning needs. Most students who were not confident and a number of students who were reportedly confident identified general and specific additional hands-on clinical learning needs. These findings may reflect the diverse range of learners within the course. It is possible that the hands-on nature of clinical teaching may favour confidence in kinaesthetic learners (9). Whilst visual learners may find it easier use observation to build their confidence, kinaesthetic learners may need to directly perform each procedure to become confident.

The variation in student experience may also have been affected by patient presentation to the clinic. Orthodontic emergency clinic provision in this study was based on patient demand. There was no triage and patients attend on a 'drop-in' basis without a formal appointment. Although certain orthodontic problems were more common, the combination of student timetabling and patient presentation appeared to result in different clinical exposures between students. Despite this, as students attended three sessions during the academic year this may dilute the effect of procedural variability. Whilst it would prove difficult to provide teaching to cover the management of every potential orthodontic emergency, the evidence suggests the most common orthodontic emergencies (i.e. debonded brackets) could be given priority (10). This was supported in our study findings as students who reported that they needed to carry out more specified procedures described common orthodontic emergencies. Therefore, an electronic clinical activity monitoring system would aid in identifying and standardising clinical activity across students (11, 12), exposing them more consistently to the most common emergency procedures. There are plans to introduce this method to the institution in the near future.

The final subtheme was learning in a supportive clinical environment, indicating that factors beyond theoretical and practical were relevant to learning and confidence. Supervisory support and instruction were commonly described in relation to confidence and a number of students described being confident under supervision but not for treating emergencies independently. This finding may be part of the transition to independence and confidence, and the role of the supervisor in this journey was important. Further studies to investigate supervisory approaches for supporting independence and confidence with orthodontic emergencies through supervision may help to pinpoint the most effective approaches for the development of this aspect of practice.

Analysis of reflective logbooks allowed sampling of the whole year group producing more representative results of the overall student experience in managing orthodontic emergencies. Study findings could be enhanced through qualitative enquiry, using focus groups to explore and enable deeper insights into student reflections and illuminate the process of developing confidence (13). There are limited published data on the confidence of

undergraduate students in treating orthodontic emergencies. Most studies have investigated self-reported confidence of dental students in treating orthodontic emergencies but not supplemented this information with the types of orthodontic emergency encountered, the setting and discerned the reasons for the reported confidence levels (4–6).

This study has explored student confidence in managing orthodontic emergency patients. Curriculum design in this area is important to allow theory-practice integration. However, even with a well-designed teaching programme, some students may still experience a theory-practice knowledge gap. Non-clinical theoretical instruction can be too idealistic and may not represent the 'real world'. Here a more structured approach of knows, knows how, shows and shows how may be more beneficial. To this extent, our curriculum has strived to achieve this although the role of the clinical supervisor still needs to be strengthened. Timetabling constraints mean that greater standardisation between multiple supervisors is needed to ensure a uniformly positive learning experience for the student.

As this study was conducted within a teaching institution, it is unlikely that all of the orthodontic emergencies encountered would present in primary care. Many patients undergoing orthodontic treatment would attend their orthodontist if faced with an orthodontic problem. For this reason, it may not be essential for students to be wholly confident when faced with less common orthodontic emergencies. Making the problem 'safe' and onward referral may be acceptable solution. This is reflective of the ADEE's approach in outlining that students should be able to manage all forms of orthodontic emergency including onward referral if necessary (3).

Ultimately, data from this study can be fed back into the dental training programme with a view to improving the teaching of orthodontic emergency management. In the future, it would be useful for students to record which orthodontic emergencies they would like to see more of, and which treatments they would like to practice to improve their confidence levels. This information would allow targeted learning opportunities to ensure teaching is better aimed to meet student's needs (14). Whilst this study provides a cross-sectional UK perspective a larger multicentre study encompassing a range of European dental schools may provide a different results. The content of undergraduate orthodontic curricula has been shown to be extremely variable across institutions (15) perhaps reflective of the differing roles performed by general practitioners within countries. For example, within the UK the GDP's role within orthodontics is primarily for diagnosis and onward referral (16). In other countries such as Sweden, certain geographic areas rely on most orthodontic treatment provision being undertaken by general practitioners (17). Here, the confidence levels of GDPs managing orthodontic emergencies may be skewed by the patient/treatment demographic of the practitioner.

Finally, as the number of short-term orthodontic treatments undertaken by general dental practitioners in the UK increases through both a general strive to increase postgraduate clinical skills and knowledge in addition to marketing strategies (18), it will mean that more orthodontic emergencies will inevitably be encountered in primary care. In turn, more emphasis will need to be placed on dental graduates confidence in treating these types of patients.

Conclusion

Overall, the majority of dental students felt confident in managing orthodontic emergencies. A supported learning environment and exposure to a range of clinical problems expanding clinical experience made students feel more confident. Maximising learning opportunities for students in this area needs appropriate integration of theory and practice and standardised clinical exposure to common orthodontic emergencies and a supportive learning environment.

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